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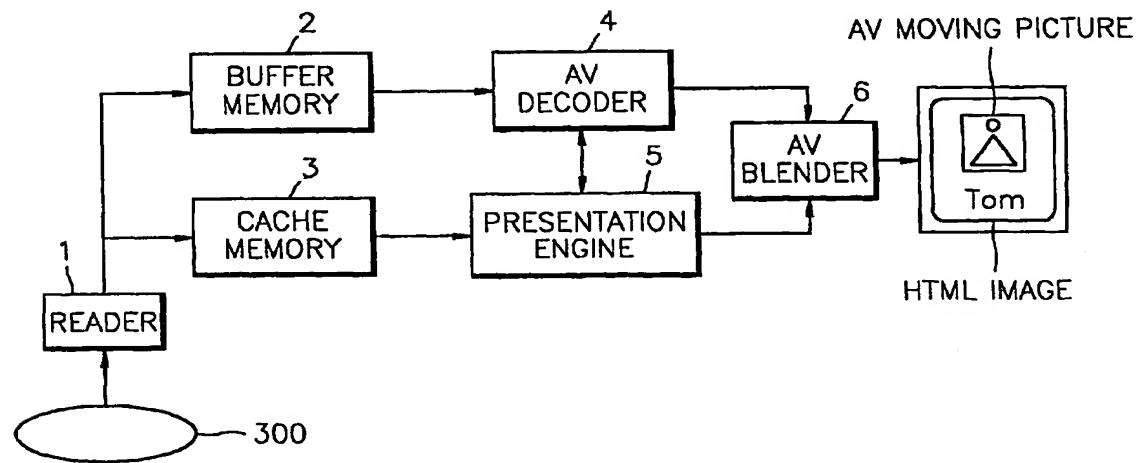
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(54) Information storage medium containing information for providing multi-language markup document, apparatus and method for reproducing thereof

(57) An information storage medium (300) containing multi-language markup document information, and an apparatus and a method for reproducing the information storage medium are provided. The provided information storage medium includes audio/video (AV) data, multiple markup documents which contain text information to be displayed in a selected language, which

is inserted when AV data decoded and reproduced as an AV data stream is displayed, and multi-language markup document information for being referred to in order to display a markup document in the selected language. Accordingly, the information storage medium displays the text information included in the markup document in the interactive mode in multiple languages.

FIG. 1



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**Description**

[0001] The present invention relates to an information storage medium, a reproducing apparatus, and a reproducing method, and more particularly, but not exclusively, to an interactive information storage medium containing multi-language markup document support information which is provided together with a reproduced data stream displayed in a display window defined by a markup document, and an apparatus and a method for reproducing the information on the storage medium.

[0002] A proposed interactive DVD medium in the current market (e.g., PC Friendly DVD disc) can be reproduced in an interactive mode based on a PC (Personal Computer). The interactive DVD medium contains markup language documents and AV (audio/video) Data. AV data recorded on the interactive DVD medium is reproduced as an AV data stream and displayed in two ways: in a video mode or an interactive mode. In the video mode, AV data is displayed in the same way as it is displayed on regular DVD players while in the interactive mode, AV data is displayed together with an HTML document in a display window defined by the HTML document. If the interactive mode is selected by a user, a web browser installed in a PC (Personal Computer) displays the HTML document recorded on the interactive DVD medium. The AV data related to the HTML document is reproduced and displayed in the display window defined by the HTML document.

[0003] For example, in the case of a movie whose content is the AV data, a video is played in the display window defined by the HTML document, and in the remaining part of the display screen, a variety of supplementary information including scripts, stories, and photos of actors and actresses can be displayed. The supplementary information may be displayed in synchronization with a title (AV data). For example, when an actor is on stage, an HTML document containing his brief history is invoked and displayed together with his video.

[0004] An existing DVD-video standard defines sub-picture data that provides a multi-language captioning together with the reproduced title. Therefore, the user can enjoy captions in a desired language when watching a program.

However, the proposed interactive DVD is disadvantageous in that it allows text-based supplementary information to be displayed in only one language, together with the AV data in the interactive mode. That is, the proposed interactive DVD does not have the capability to present the supplementary information displayed through the HTML document in multiple languages. Therefore, a user cannot understand text-based information displayed through the HTML document in a language that is foreign to the user. As a result, the interactive mode provided by the interactive DVD is not attractive to the user.

[0005] It is an aim of preferred embodiments of the present invention to provide an information storage me-

dium for providing text information displayed through a markup document in an interactive mode in multiple languages, and an apparatus and a method for reproducing the information on the storage medium.

5 [0006] According to the present invention in a first aspect, there is provided, an information storage medium comprising audio/video (AV) data, multiple markup documents which contain text information on multiple languages, respectively, to be displayed in a selected language and defines a display window to display AV data decoded and reproduced as an AV data stream, and multi-language markup document support information for being referred to in order to display a markup document in the selected language.

10 [0007] It is preferable that the medium further comprises navigation data on the AV data, wherein the AV data is decoded and reproduced as the AV data stream with reference to the navigation data.

15 [0008] It is preferable that the AV data and the navigation data are recorded on a video directory while the markup documents and the multi-language markup document information are recorded on an interactive directory.

20 [0009] According to the present invention in a second aspect, there is provided, an information storage medium comprises audio/video (AV) data, sub-picture data for providing a multi-language captioning together with the reproduced AV data, multiple markup documents which contain text information on multiple languages, respectively, to be displayed in a selected language with regard to the AV data or the sub-picture data, and defines a display window to display the AV data decoded and reproduced as an AV data stream, and multi-language markup document information for being referred to in order to display a markup document in the selected language.

25 [0010] It is preferable that the medium further comprises navigation data on the AV data and the sub-picture data, wherein the AV data and the sub-picture data are decoded and reproduced as the AV data stream and captioning with reference to the navigation data.

30 [0011] It is preferable that the AV data, the sub-picture data, and the navigation data are recorded on a video directory while the markup documents and the multi-language markup document information are recorded on an interactive directory.

35 [0012] It is preferable that the markup documents are recorded in multi-language markup document directories named by respective language, which are sub-directories of the interactive directory, and it is further preferable that markup documents containing the same meaning text information displayed in multiple languages have the same file name when saved.

40 [0013] It is preferable that the multi-language markup document displaying information comprises displayable language information that indicates the kind of the displayable languages recorded on medium, and respective language directory information for indicating the

path to the markup documents recorded in. It is more preferable that language mapping information for mapping a markup document to the selected language is recorded.

[0014] According to the present invention in a third aspect, there is provided, a reproducing method for reproducing AV data recorded on an information storage medium and displaying the AV data in a display window defined by a markup document, the reproducing method comprising (a) reading a markup document designed to be displayed in a selected language for caption, out of multiple markup documents that enable text information to be displayed in multiple languages, respectively, (b) reading and decoding the AV data, and (c) displaying the AV data, which has been reproduced, as an AV data stream through the read markup document.

[0015] According to the present invention in a fourth aspect, there is provided, a reproducing method for reproducing AV data and sub-picture data, which are recorded on an information storage medium, and for displaying the AV data and the sub-picture data in a display window defined by a markup document, the reproducing method comprising (a) receiving language information on a selected language in order to present captioning, (b) identifying the language corresponding to the received language information, and (c) retrieving the markup document in the directory corresponding to the identified language.

[0016] It is preferable that step (a) comprises (a1) identifying a markup document conversion language code corresponding to the language code selected for caption display by using language mapping information, and (a2) invoking the markup document in the directory where the identified language code is stored.

[0017] It is preferable that in step (a2), the markup document is stored in the directory that has the same name as that of the identified language code is invoked.

[0018] According to the present invention in a fifth aspect, there is provided, a reproducing method for reproducing AV data recorded on an information storage medium and displaying an AV data stream in a display window defined by a markup document, the reproducing method comprising (a) reading a markup document designed to be displayed in a selected language, out of markup documents that enable text information to be displayed in multiple languages, respectively, (b) reading and decoding the AV data, and (c) displaying the AV data as the AV data stream in a display window.

[0019] According to the present invention in a sixth aspect, there is provided, a reproducing method for reproducing AV data recorded on an information storage medium and displaying the AV data in a display window defined by a markup document, the reproducing method comprising (a) receiving information on a selected language in order to display the markup document, (b) identifying the language corresponding to the received language information, and (c) retrieving the markup document in the directory corresponding to the identified

language.

[0020] It is preferable that step (b) comprises (b1) retrieving the markup document language code corresponding to the selected language by using language mapping information, and (b2) retrieving and invoking the markup document in the directory corresponding to the retrieved language code.

[0021] According to the present invention in a seventh aspect, there is provided, a reproducing apparatus for reproducing AV data recorded on an information storage medium and displaying the AV data in a display window defined by a markup document, the reproducing device comprising a reader for reading necessary data from the information storage medium, an AV decoder for decoding the AV data read by the reader, and an AV blender for displaying a markup document decoded by a presentation engine and an AV data stream reproduced after the AV decoder decodes the AV data, in a display window defined by a markup document, and a presentation engine for interpreting a markup document that has the text information to be displayed in a selected language, out of multiple markup documents that have text information to be displayed in multiple languages, respectively.

[0022] According to the present invention in an eighth aspect, there is provided, a reproducing device for reproducing AV data and multi-language captioning specific sub-picture data, which are recorded on an information storage medium, and for displaying the AV data and the captions in a display window defined by a markup document, the reproducing device comprising a reader for reading necessary data from the information storage medium, an AV decoder for decoding the AV data read by the reader, and an AV blender for displaying a markup document decoded by a presentation engine, AV data and the sub-picture data for caption display, a presentation engine for interpreting the markup document recorded in the directory indicated by the received language information to be stored in the information to display multi-language markup documents, and displaying the AV data stream reproduced after the decoder decodes the AV data in the display window defined by the markup document.

[0023] It is preferable that when the markup document is displayed in connection with the captions, the presentation engine refers to the multi-language markup document information, retrieves a markup document language code corresponding to the language code selected for the caption display, and retrieves and invokes the markup document recorded in the directory which the retrieved language code indicates to. If only the markup document is displayed, the presentation engine refers to the multi-language markup document information and retrieves and invokes the markup document stored in the directory corresponding to the selected language by user preference.

[0024] Further features of the present invention are set out in the appended claims.

[0025] The above object and advantages of the present invention will become more apparent by describing in detail preferred embodiments thereof with reference to the attached drawings in which:

FIG. 1 is a block diagram of a reproducing apparatus according to a preferred embodiment of the present invention;  
 FIG. 2 shows the structure of files in an embodiment of a DVD of the present invention;  
 FIG. 3 is a diagram of the volume space of the embodiment of the DVD of the present invention;  
 FIG. 4 is a diagram showing the structure of file DVD\_ENAV.IFO explained in FIGS. 2 and 3;  
 FIG. 5 is a detailed structure diagram of an embodiment of multi-language markup document information;  
 FIG. 6 shows examples of markup documents retrieved and displayed with reference to the multi-language markup document information of FIG. 5;  
 FIG. 7 is a flowchart explaining a reproduction method according to an embodiment of the present invention; and  
 FIG. 8 is a flowchart explaining a reproduction method according to another embodiment of the present invention.

[0026] The present invention now will be described more fully with reference to the accompanying drawings, in which preferred embodiments of the invention are shown. A markup document, in the specification, means not only a markup document itself but also a web resource that includes files inserted into or linked with the markup document. An HTML document means a document which is prepared in a mark-up language such as XML or SGML and can be interpreted and displayed by the web browser.

[0027] FIG. 1 is a block diagram of a reproducing apparatus according to a preferred embodiment of the present invention.

[0028] With reference to FIG. 1, the reproducing apparatus decodes AV data recorded on an embodiment of a DVD 300 of the present invention and reproduces the AV data as an AV data stream. Then, the reproducing apparatus displays the AV data in a display window defined by a markup document in an interactive mode and includes a reader 1, a buffer memory 2, a cache memory 3, an AV decoder 4, a presentation engine 5, and an AV blinder 6.

[0029] The presentation engine 5 supports the interactive mode.

[0030] In terms of software, the presentation engine 5 includes application programs such as a markup document viewer (ex. web browser), a program interpretation engine, and a plug-in that interfaces through Application Program Interface (API) with the operating system of the reproducing apparatus. With the API, which is a special pre-defined method, the presentation engine

5 can send a request to the OS and other application programs. The program interpretation engine includes a JavaScript or a Java interpretation engine. The plug-in enables various markup documents to be displayed.

[0031] In terms of hardware, the presentation engine 5 is set to have a default value on the markup document language information of reproducing apparatus, that is, the information about the language of the markup document that is displayed when the interactive mode is selected. For example, the reproducing apparatus to be released in English-speaking nations has markup document language information that commands the selection of the markup document having text information in English. It is preferable that the markup document language information varies depending on where the reproducing device is marketed or which languages are dominant. If a user changes a default value on the markup document language information, the markup document is displayed in the new selected language or relevant language.

[0032] The reader 1 reads the HTML document or the AV data from the DVD 300. The embodiment of the DVD 300 of the present invention contains a data packet where sub-picture data and AV data are multiplexed and packaged. Therefore, reading the AV data means reading the sub-picture together with the AV data. However, if the user does not select the caption display function, the sub-picture data is discarded without being reproduced. The buffer memory 2 buffers the AV data read by the reader 1. The cache memory 3 caches the markup document read by the reader 1. The AV decoder 4 decodes the AV data buffered in the buffer memory 2 and outputs the AV data stream. The presentation engine 5 interprets the read markup document and identifies the location of the display window. Then, the AV blinder 6 displays markup document outputted by the presentation engine 5 and the AV data stream outputted by the AV decoder 4 in the display window.

[0033] FIG. 2 shows the structure of files in the embodiment of the DVD 300 of the present invention.

[0034] The DVD 300 contains multiple markup documents having the same meaning content in different languages so that text information included in the markup documents can be displayed in multiple languages. That is, the DVD 300 according to the preferred embodiments of the present invention includes multiple markup documents which contain exactly the same meaning text information in multiple languages, respectively.

[0035] With reference to FIG. 2, a root directory includes directories VIDEO\_TS and DVD\_ENAV. The VIDEO\_TS is a DVD video directory containing the AV data, and DVD\_ENAV is a DVD interactive directory for recording the data including the markup document that supports the interactive mode.

[0036] The VIDEO\_TS directory includes VIDEO\_TS.IFO, VTS\_01\_0.IFO, VTS\_01\_0.VOB, and VTS\_01\_1.VOB, ... VIDEO\_TS.IFO contains the reproducing control information (or navigation data) on the

entire video title and the language information designated as a default value of the video title. In VTS\_01\_0.IFO, the reproducing control information on the first video title set is recorded. VTS\_01\_0.VOB and VTS\_01\_1.VOB are Video Object Set (VOBS) that make up the video title set. Each VOB includes video data, audio data, and sub-picture data. The sub-picture data is designed to display the captions of the movie. More detailed configuration information is included in the DVD-Video Standard DVD-Video for Read Only Memory Disc 1.0.

[0037] The DVD\_ENAV directory includes the file DVD\_ENAV.IFO which contains the reproducing control information on the entire title information in interactive mode. To be more specific, DVD\_ENAV.IFO includes the definition and configuration of the relevant directory, the number of titles included, basic information, the language used for the title, information on captions and fonts, markup document display information such as resolution and color, and copyright information. DVD\_ENAV.IFO further includes multi-language markup document information according to the present embodiment. The multi-language markup document information will be described in detail later. In addition, multi-language markup document directories, including KOR, JPN, and ENG, are prepared to support languages of the markup document according to the embodiment. KOR, JPN, and ENG indicate a Korean Language directory, a Japanese Language directory, and an English Language directory, respectively. Each multi-language markup document directory includes the file A.HTM which has the same meaning text information in the associated language, and files W.PNG, X.PNG, and Y.PNG which are displayed together with A.HTM. Because W.PNG, X.PNG, and Y.PNG are the same image, they may have the same file name. A Portable Network Graphics (PNG) file is a compressed graphic image file. Here, it is obvious that an audio file such as an au file or an aiff file can be attached to an image file instead of the PNG file in another language.

[0038] FIG. 3 is an outline diagram of the volume space of the embodiment of the DVD 300 of the present invention.

[0039] With reference to FIG. 3, the volume space of the DVD 300 includes a control information section that includes the control information on volume and the file, a DVD-video data section that includes a relevant video title data, and a DVD-interactive data section that contains data that supports the interactive mode.

[0040] The DVD-video data section contains the files VIDEO\_TS.IFO, VTS\_01\_0.IFO, VTS\_01\_0.VOB, VTS\_01\_1.VOB, ... that are recorded in DVD\_TS, which is the DVD video directory of FIG. 2. The DVD-interactive data section contains the files DVD\_ENAV.IFO, A.HTM (KOR), A.HTM (JPN), A.HTM (ENG), W.PNG, X.PNG, and Y.PNG, which are recorded in DVD\_ENAV, the DVD interactive directory of FIG. 2.

[0041] FIG. 4 shows the structure of the file DVD\_ENAV.IFO explained in FIGS. 2 and 3.

[0042] With reference to FIG. 4, DVD\_ENAV.IFO includes the multi-language markup document information according to the present invention. The multi-language markup document information contains information on the kind of languages that can be displayed, language mapping information, and information on the directory by respective language.

[0043] FIG. 5 is a detailed structure diagram of an embodiment of multi-language markup document information according to the present invention. With reference to FIG. 5, the displayable language information included in the multi-language markup document information includes information on the number of displayable languages, the codes of the displayable languages and whether the languages can be changed during reproduction.

[0044] The codes of the displayable languages can be indicated as ISO-639 language codes. 0x0412, 0x0411 and 0x0409 are hexadecimal values and indicate Korean, Japanese, and English, respectively.

[0045] In a language mapping table, which contains the language mapping information, caption language codes are mapped to language codes for mapping to relevant HTML documents which are referred to for extracting the markup documents that contain text information to be displayed in the languages corresponding to the caption language codes. To be more specific, the captions are displayed in Korean, Japanese, English, or Chinese. The markup document displayed with the captions is displayed in Korean, Japanese, or English. Therefore, if the user selects Korean, Japanese, or English for the captions, the markup document is displayed in the corresponding language, Korean, Japanese, or English. However, if the user selects Chinese for caption display, the markup document is displayed in English.

[0046] The number of displayable languages can vary. Even when the markup document is displayed without interworking with the captioning, the language mapping table can be referred to for extracting the markup document. For example, if the language of the reproducing apparatus is set as Chinese (ZH), the presentation engine 5 displays the markup document prepared in English (EN-US) by referring to the language mapping table. The information on changeability of markup document language indicates whether the user can change the language during reproduction of the AV data. 0 indicates that the language cannot be changed while 1 indicates that the language can be changed.

[0047] The language directory information includes the path names of the multi-language markup document directories containing markup documents corresponding to the displayable language codes, respectively and the file name of the HTML document designated as a start document file.

[0048] FIGS. 6A through 6C show markup documents

displayed when Korean captions, Japanese captions, and English or Chinese captions are selected, respectively. In case of Chinese caption, the captions language is different from the text information is displayed in the markup document. That is, since a multi-language markup document is supported in the interactive mode, embodiments of the present invention can display the markup document containing the text information prepared in the language mapped to the captioning selected by the user or the language selected by the user. If the user changes the Korean captions into Japanese captions while a video title is reproduced in the interactive mode, the markup document displayed together is changed from FIG. 6A to FIG. 6B. That is, the present embodiment reads and displays A.HTM, the markup document, stored in the multi-language markup document directory JPN by referring to the language mapping table and the language directory information shown in FIG. 5.

[0049] If the markup document is displayed without interworking with the captioning, the markup document containing the text information prepared in the language selected by the user is displayed even though the caption is not displayed.

[0050] The reproducing method according to a preferred embodiment of the invention is described as follows.

[0051] FIG. 7 is a flowchart explaining a reproduction method according to the present Invention.

[0052] With reference to FIG. 7, if the interactive-DVD 300 according to the present invention is inserted into the reproducing apparatus, the presentation engine 5 of the reproducing apparatus retrieves the language information recorded on VIDEO\_TS.IFO and identifies if the language designated as a default value of the reproducing apparatus exists in step 701. If the language information recorded on VIDEO\_TS.IFO of the interactive-DVD 300 does not have the language designated as the default value of the reproducing apparatus, the presentation engine 5 sets the language designated as a default value of VIDEO\_TS.IFO or DVD\_ENAV.IFO of the interactive-DVD 300 as the default value for the reproduction of the markup document in step 702.

[0053] If the language information recorded in VIDEO\_TS.IFO of the interactive-DVD 300 has the language designated as the default value of the reproducing apparatus, the presentation engine 5 sets the language as the default value for reproduction of the markup document in step 701.

[0054] The reader 1 reads the markup document prepared in the designated language in step 703. For example, if the Korean language is set as the default value for reproduction of the markup document, the reader 1 reads A.HTM stored in the Korean directory KOR of the multi-language markup document directory. The presentation engine 5 displays the read markup document in step 704.

[0055] If the user changes the language of the caption

in step 705, the presentation engine 5 identifies whether the languages of the displayed markup documents can be changed during reproduction of the AV data by referring to the multi-language markup document information described above in step 706. If possible, the presentation engine retrieves the relevant markup document with reference to the multi-language markup document information and the reader 1 reads the retrieved markup document in step 707. The presentation engine 5 displays the read markup document in step 708. If the user completes the reproduction of the reproducing apparatus, the process ends in step 709. If the user changes the language of the caption again during the reproduction, steps 706 through 708 are repeated.

[0056] FIG. 8 is a flow chart explaining the reproduction method according to another embodiment of the present invention.

[0057] With reference to FIG. 8, if the interactive-DVD 300 according to the present invention is inserted into the reproducing apparatus, the presentation engine 5 of the reproducing apparatus retrieves the language information recorded on VIDEO\_TS.IFO and identifies if the language designated as a default value of the reproducing apparatus exists in step 801. If the language information recorded on the VIDEO\_TS.IFO of the interactive-DVD 300 does not have the language designated as the default value of the reproducing device, the presentation engine 5 sets the language designated as a default value of VIDEO\_TS.IFO or DVD\_ENAV.IFO of the interactive-DVD 300 as the default value for the reproduction of the markup document in step 802.

[0058] If the language information recorded on the VIDEO\_TS.IFO of the interactive-DVD 300 has the language designated as the default value of the reproducing device, the presentation engine sets the language as the default value for reproduction of the markup document in step 801.

[0059] The reader 1 reads the markup document prepared in the designated language in step 803. For example, if the Korean language is set as the default value for reproduction of the markup document, the reader 1 reads A.HTM recorded in the Korean directory KOR of the multi-language markup document directory. The presentation engine 5 displays the read markup document in step 804.

[0060] If the user requests the language of the markup document to be changed in step 805, the presentation engine 5 interprets the multi-language markup document information and identifies if the languages of the displayed markup documents can be changed during reproduction of the AV data in step 806. If the language change is possible, the presentation engine displays a menu where the kind of displayable languages that can be selected is indicated by referring to the displayable language information of the multi-language markup document information in step 807. If the user selects the language in step 808, the presentation engine 5 retrieves the relevant markup document by referring to the

language directory information (and the language mapping table) and the reader 1 reads the retrieved markup document in step 809. The presentation engine 5 displays the read markup document in step 810. If the user completes the reproduction of the reproducing apparatus, the process ends in step 811. If the user requests the language of the markup document to be changed again during the reproduction, steps 806 through 810 are repeated.

[0061] As described above, preferred embodiments of the present invention relates to an information storage medium that displays the text information included in the markup document in the interactive mode in multiple languages and to an apparatus and a method for reproducing the information storage medium.

[0062] The reader's attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

[0063] All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

[0064] Each feature disclosed in this specification (including any accompanying claims, abstract and drawings), may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

[0065] The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

### Claims

#### 1. An information storage medium comprising:

audio/video (AV) data;  
multiple markup documents which contain text information on multiple languages, respectively, to be displayed in a selected language and defines a display window to display AV data decoded and reproduced as an AV data stream; and  
multi-language markup document support information for being referred to in order to display a markup document in the selected language.

#### 2. A medium of claim 1 further comprising:

navigation data on the AV data,

5 wherein the AV data is decoded and reproduced as the AV data stream with reference to the navigation data.

10 3. A medium of claim 2, wherein the AV data and the navigation data are recorded on a video directory while the markup documents and the multi-language markup document support information are recorded on an interactive directory.

15 4. An information storage medium comprising:

audio/video (AV) data;  
sub-picture data for providing a multi-language captioning together with the reproduced AV data;

20 multiple markup documents which contain text information on multiple languages, respectively, to be displayed in a selected language with regard to the AV data or the sub-picture data, and defines a display window to display the AV data decoded and reproduced as an AV data stream; and

25 multi-language markup document support information for being referred to in order to display a markup document in the selected language.

#### 5. A medium of claim 4 further comprising:

30 35 navigation data on the AV data and the sub-picture data,

wherein the AV data and the sub-picture data are decoded and reproduced as the AV data stream and captioning with reference to the navigation data.

40 45 6. A medium of claim 5, wherein the AV data, the sub-picture data, and the navigation data are recorded on a video directory while the markup documents and the multi-language markup document support information are recorded on an interactive directory.

50 7. A medium of any one of claims 4 to 6, wherein the markup documents are saved in multi-language markup document directories created by language, which are sub-directories of the interactive directory.

55 8. A medium of any one of claims 4 to 7, wherein markup documents containing the same text information displayed in multiple languages have the same file name when saved.

9. A medium of claim 6, wherein the multi-language markup document support information comprises:  
 language selection conversion information for mapping a related markup document to the selected language; and  
 language directory information for indicating the path to the markup documents. 5  
 (a1) identifying a markup document conversion language code corresponding to the language code selected for caption display by using language mapping information; and  
 (a2) invoking the markup document in the directory where the identified language code is stored.

10. A medium of claim 9, wherein the multi-language support information further includes supportable language information that indicates the language that can be supported. 10  
 11. A medium of claim 10, wherein the supportable language information includes the information that indicates whether a language can be converted during reproduction. 15  
 12. A medium of claim 9, wherein the language selection conversion information includes a language selection conversion table where the language selected for caption display is mapped to a relevant language. 20  
 13. A reproducing method for reproducing AV data recorded on an information storage medium and displaying the AV data in a display window defined by a markup document, the reproducing method comprising:  
 (a) reading a markup document designed to be displayed in a selected language for caption, out of multiple markup documents that enable text information to be displayed in multiple languages, respectively; 30  
 (b) reading and decoding the AV data; and  
 (c) displaying the AV data, which has been reproduced, as an AV data stream through the read markup document. 35  
 14. A reproducing method for reproducing AV data and sub-picture data which presents multi-language captioning, which are recorded on an information storage medium, and for displaying the AV data and the sub-picture data in a display window defined by a markup document, the reproducing method comprising:  
 (a) receiving language information on a selected language in order to present captioning; 40  
 (b) identifying the language corresponding to the received language information; and  
 (c) reading the markup document in the directory corresponding to the identified language. 45  
 15. A method of claim 14, wherein step (a) comprises:  
 (b0) verifying if the language can be converted during the reproduction and performing (b) if language conversion is possible.

16. A method of claim 15, wherein in step (a2), the markup document stored in the directory that has the same name as that of the identified language code is invoked. 50  
 17. A reproducing method for reproducing AV data recorded on an information storage medium and displaying an AV data stream in a display window defined by a markup document, the reproducing method comprising:  
 (a) reading a markup document designed to be displayed in a selected language, out of markup documents that enable text information to be displayed in multiple languages, respectively; 55  
 (b) reading and decoding the AV data; and  
 (c) displaying the AV data as the AV data stream in a display window.

18. A reproducing method for reproducing AV data recorded on an information storage medium and displaying the AV data in a display window defined by a markup document, the reproducing method comprising:  
 (a) receiving information on a selected language in order to display the markup document; 60  
 (b) retrieving the language corresponding to the received language information; and  
 (c) retrieving the markup document in the directory corresponding to the retrieved language.

19. A method of claim 18, wherein step (b) comprises:  
 (b0) verifying if the language can be converted during the reproduction and performing (b) if language conversion is possible.

20. A method of claim 19, wherein step (b) comprises:  
 (b1) retrieving the markup document conversion language code corresponding to the selected language by using language mapping information; and  
 (b2) retrieving and invoking the markup document in the directory corresponding to the retrieved language code. 65  
 21. A reproducing apparatus for reproducing AV data recorded on an information storage medium and

displaying the AV data in a display window defined by a markup document, the reproducing device comprising:

a reader for reading necessary data from the information storage medium;  
an AV decoder for decoding the AV data read by the reader; and  
a presentation engine for displaying an AV data stream reproduced after the decoder decodes the AV data, in a display window defined by a markup document, by interpreting a markup document that enables the inserted text information to be displayed in a selected language, out of multiple markup documents that enable inserted text information to be displayed in multiple languages, respectively.

22. A reproducing device for reproducing AV data and sub-picture data which presents multi-language captioning, which are recorded on an information storage medium, and for displaying the AV data and the captions in a display window defined by a markup document, the reproducing device comprising:

a reader for reading necessary data from the information storage medium;  
a decoder for decoding the AV data read by the reader; and  
a presentation engine for receiving information on a selected language for caption display, interpreting the markup document stored in the directory where the received language information is stored by referring to multi-language markup document support information, and displaying the AV data stream reproduced after the decoder decodes the AV data in the display window defined by the markup document.

23. A device of claim 22, wherein the presentation engine refers to the multi-language markup document support information and retrieves and invokes the markup document stored in the directory corresponding to the selected language.

24. A device of claim 23, wherein the presentation engine refers to the multi-language markup document support information, retrieves a markup document conversion language code corresponding to the language code selected for the caption display, and retrieves and invokes the markup document stored in the directory where the retrieved language code is stored.

25. A device of claim 24, wherein the presentation engine verifies whether the language can be converted during the reproduction by referring to the multi-

language markup document support information and retrieves and invokes the markup document if language conversion is possible.

5 26. A device of claim 24, wherein the presentation engine retrieves and invokes the markup document stored in the directory which has the same name as that of the retrieved language code.

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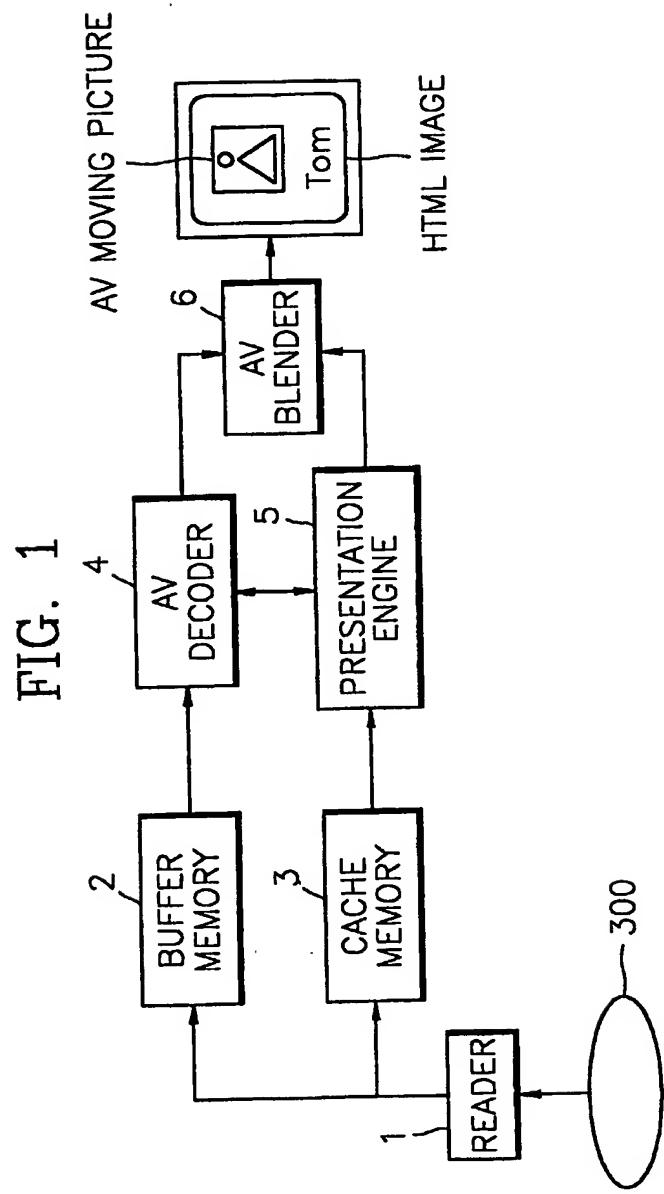


FIG. 2

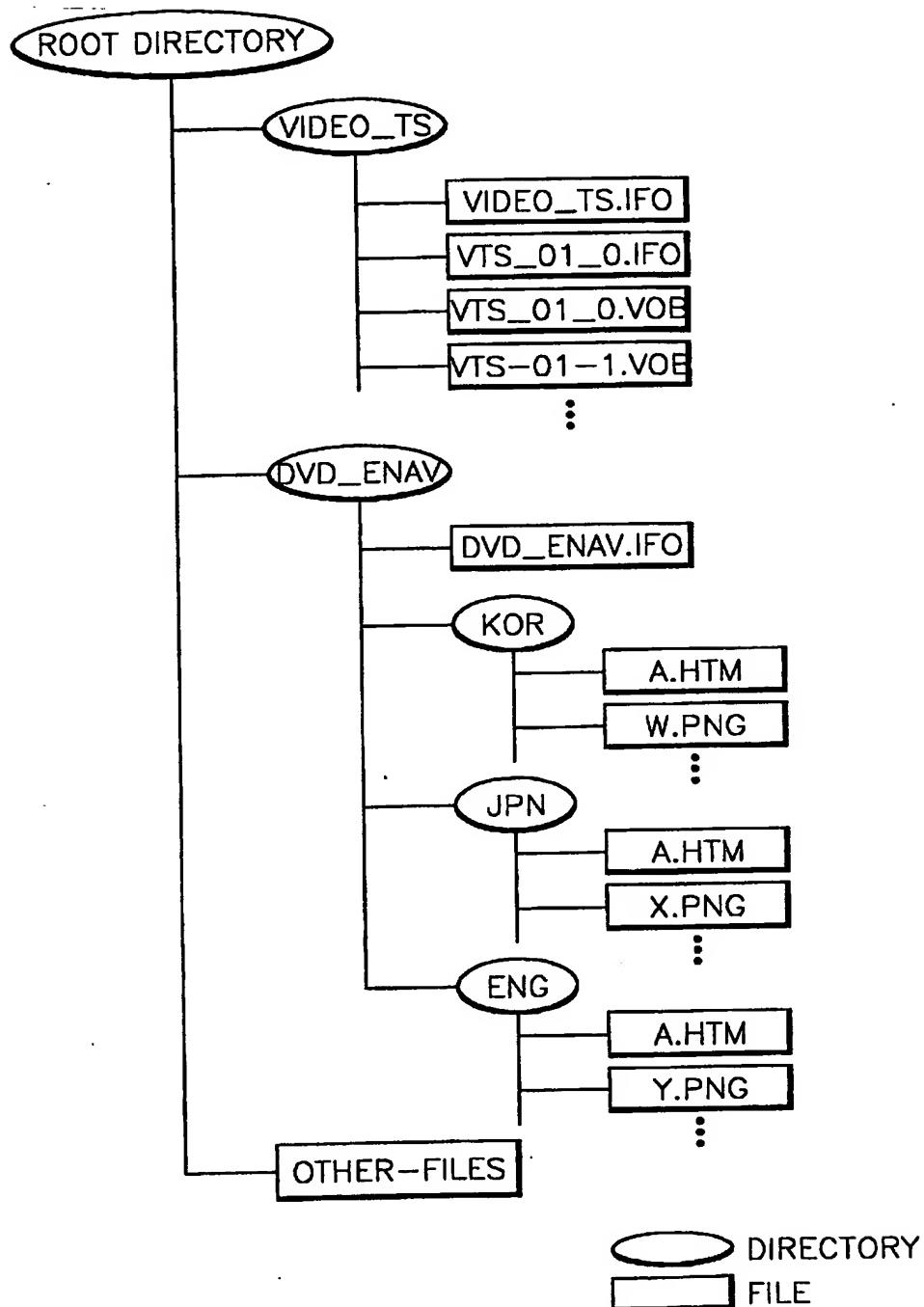


FIG. 3

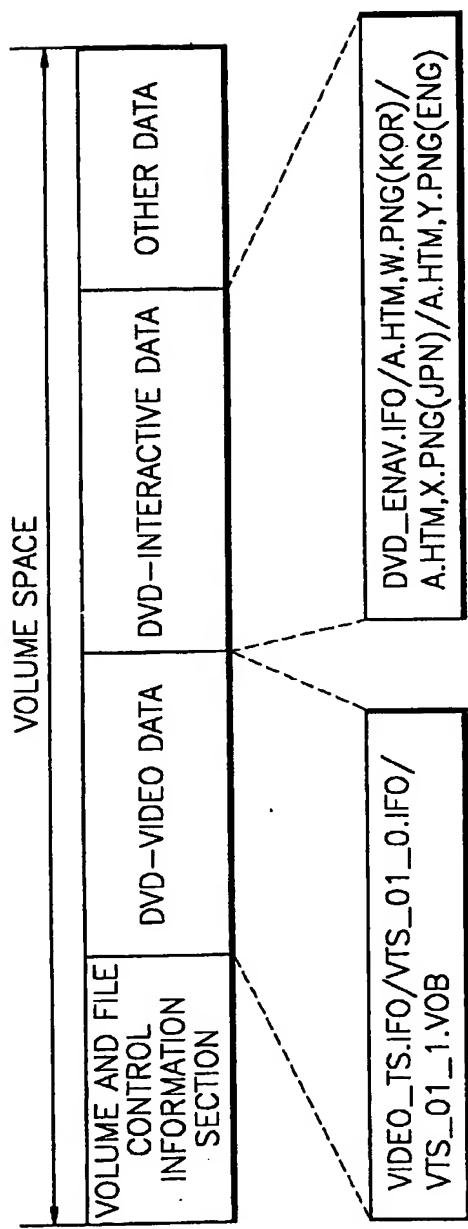
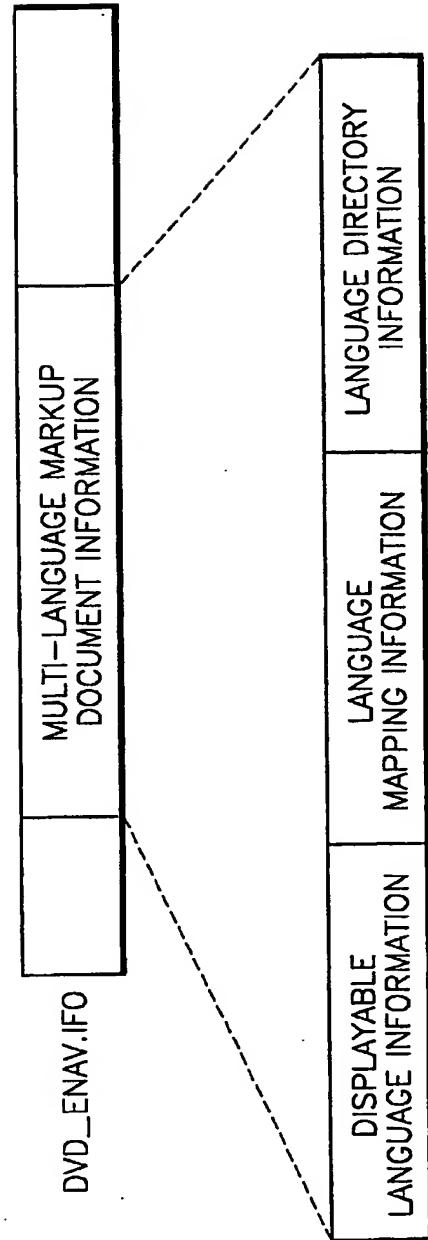


FIG. 4



## FIG. 5

MULTI-LANGUAGE MARKUP  
DOCUMENT INFORMATION

## • DISPLAYABLE LANGUAGE INFORMATION

INFORMATION	VALUE
NUMBER OF DISPLAYABLE LANGUAGES	3
CODE OF DISPLAYABLE LANGUAGES	0x0412, 0x0411, 0x0409
CHANGEABILITY OF LANGUAGE CONVERSION DURING REPRODUCTION	1 OR 0

## • LANGUAGE MAPPING TABLE

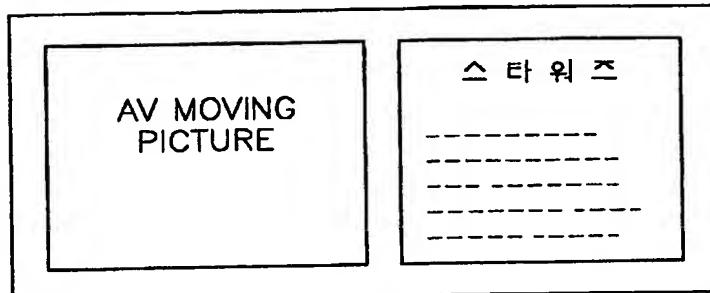
DVD-VIDEO LANGUAGE CODE	HTML DOCUMENT LANGUAGE CODE
KR(0x0412)	KR(0x0412)
JP(0x0411)	JP(0x0411)
EN-US(0x0409)	EN-US(0x0409)
ZH(0x0004)	EN-US(0x0409)

## • LANGUAGE-DIRECTORY INFORMATION

CHARACTER CODE (ISO-639)	PATH NAME OF LANGUAGE DIRECTORY AND START HTML DOCUMENT
KR(0x0412)	\DVD_ENAV\KOR\A.HTM
JP(0x0411)	\DVD_ENAV\JPN\A.HTM
EN-US(0x0409)	\DVD_ENAV\ENG\A.HTM

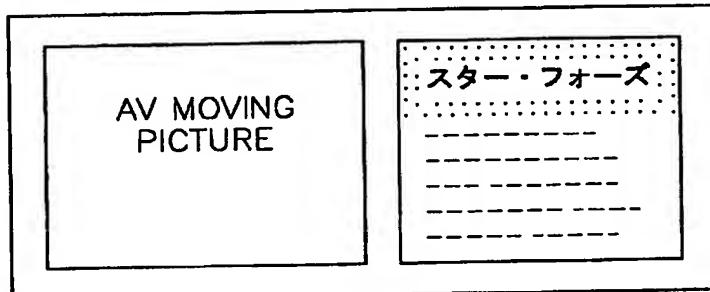
## FIG. 6

### (A) KOREAN



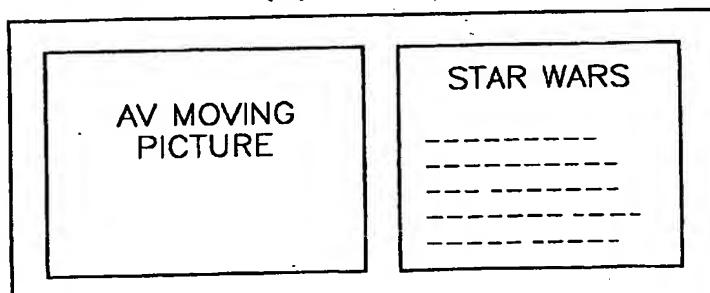
\DVD\_ENAV\KOR\A.HTM OUTPUT

### (B) JAPANESE



\DVD\_ENAV\JPN\A.HTM OUTPUT

### (C) ENGLISH



\DVD\_ENAV\ENG\A.HTM OUTPUT

FIG. 7

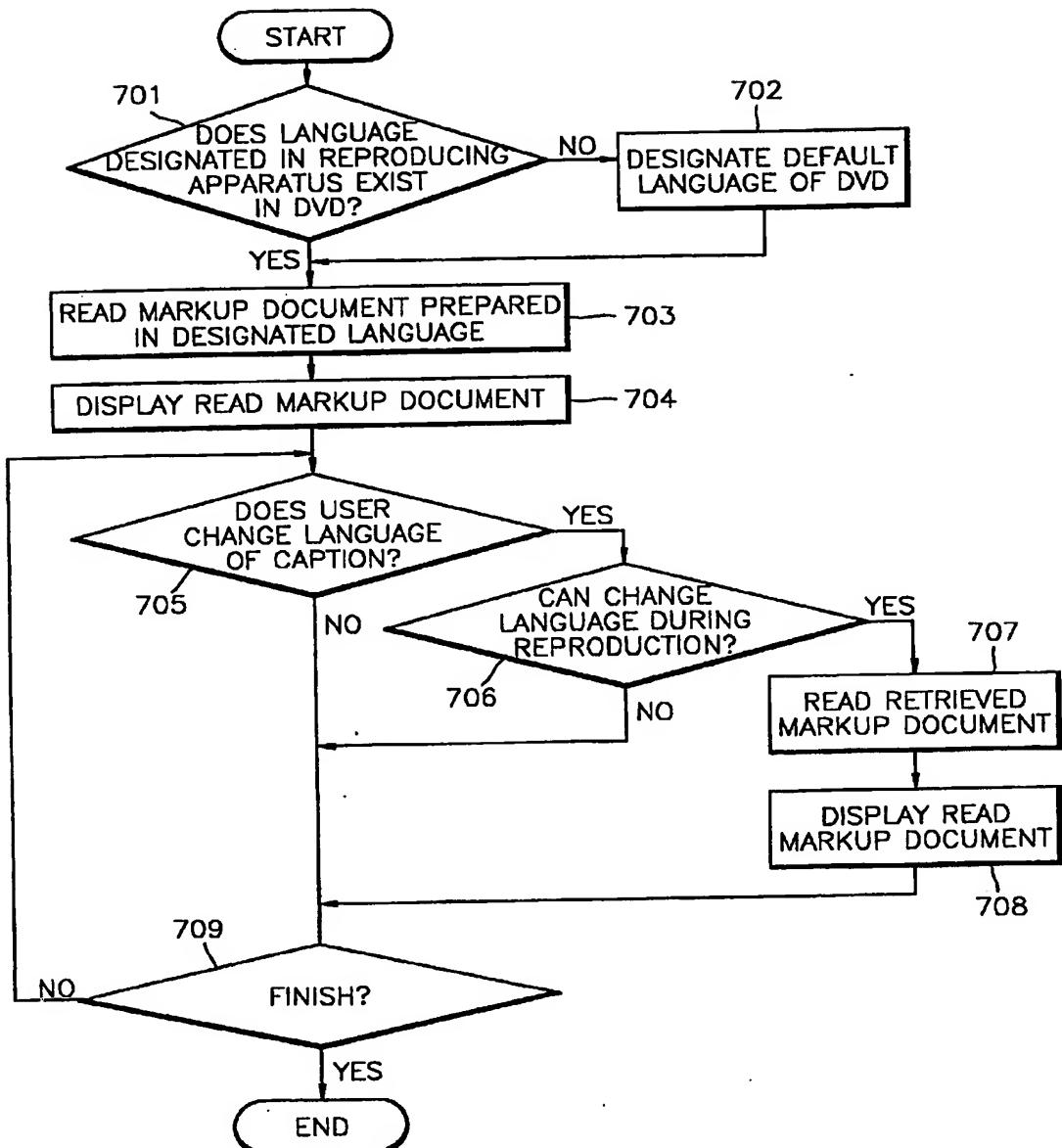
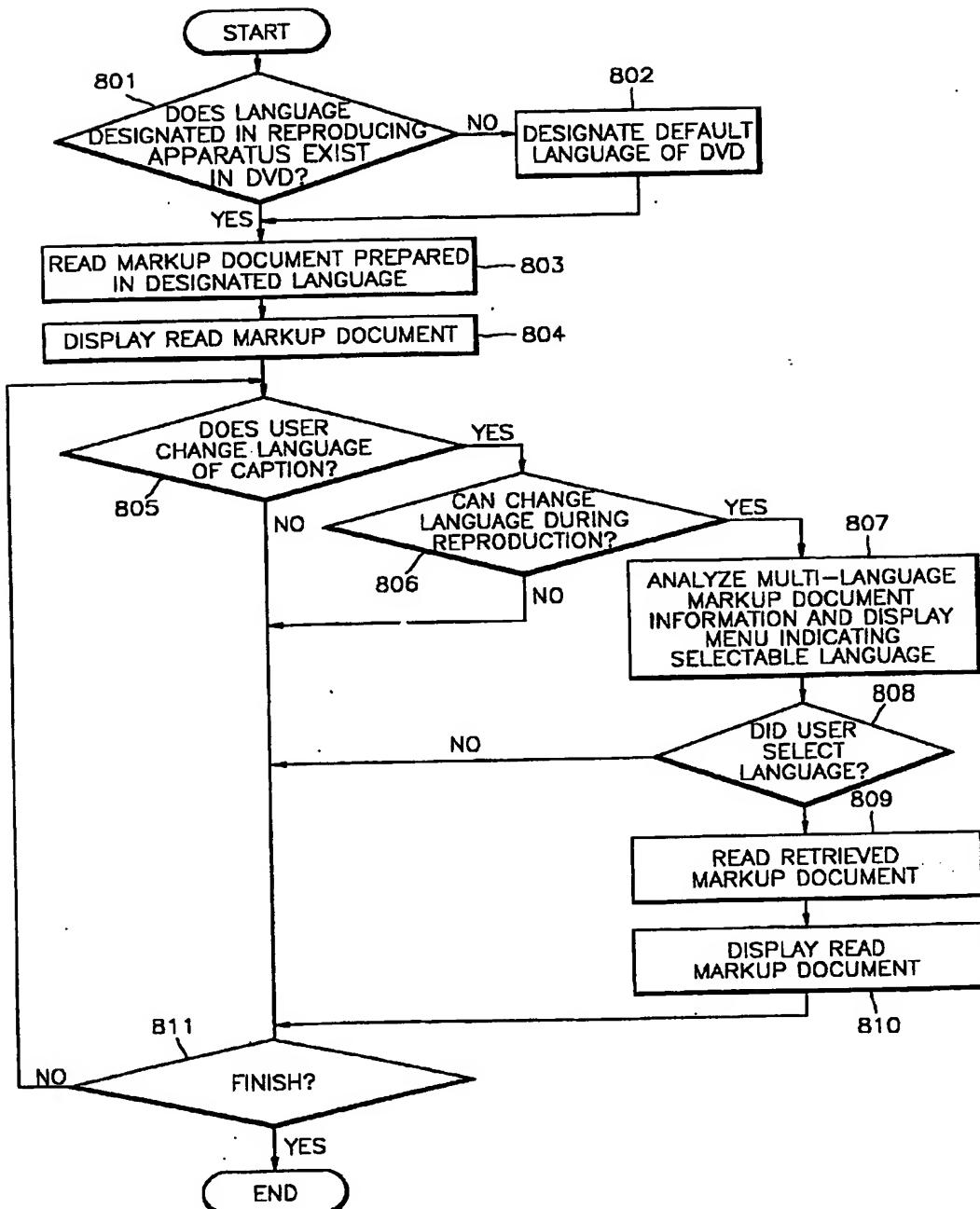


FIG. 8





DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	EP 0 886 276 A (PIONEER ELECTRONIC CORP) 23 December 1998 (1998-12-23)  * column 16, line 40 - column 18, line 10 * * column 26, line 16 - line 44 *	1,2,4,5, 13,14, 17,18, 21,22	G11B27/10 G11B27/32 G11B20/12 G11B19/02 G09B5/06 G06F17/30
Y	---	3,6,7,23	
Y	EP 0 762 422 A (HITACHI LTD) 12 March 1997 (1997-03-12) * column 18, line 35 - column 26, line 20; figures 23-28 *	3,6,7,23	
A	---	1,4,13, 14,18, 21,22	
A	US 4 899 292 A (MONTAGNA JOHN A ET AL) 6 February 1990 (1990-02-06)  * the whole document *	1,4,13, 14,17, 18,21,22	
P,A	WO 02 05104 A (INTERACTUAL TECHNOLOGIES INC) 17 January 2002 (2002-01-17)  * the whole document *	1,2,4,5, 13,14, 17,18, 21,22	G11B G06F H04N G09B
A	US 6 047 292 A (KELLY ROBERT L ET AL) 4 April 2000 (2000-04-04)  * the whole document *	1,4,13, 14,17, 18,21,22	
A	WO 00 63915 A (SPRUCE TECHNOLOGIES INC) 26 October 2000 (2000-10-26)  * the whole document *	1,4,13, 14,17, 18,21,22	
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The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
THE HAGUE	3 January 2003	Daalmans, F	
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			



European Patent  
Office

## EUROPEAN SEARCH REPORT

Application Number  
EP 02 25 4067

DOCUMENTS CONSIDERED TO BE RELEVANT												
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.)									
A	PATENT ABSTRACTS OF JAPAN vol. 1999, no. 11, 30 September 1999 (1999-09-30) -& JP 11 161663 A (TOSHIBA CORP), 18 June 1999 (1999-06-18) * abstract *	1,4,13, 14,17, 18,21,22										
A	-& JP 11 161663 A 18 June 1999 (1999-06-18) * figures 1-4 *	1,4,13, 14,17, 18,21,22										
A	PATENT ABSTRACTS OF JAPAN vol. 2000, no. 09, 13 October 2000 (2000-10-13) -& JP 2000 182359 A (TOSHIBA CORP;TOSHIBA AVE CO LTD), 30 June 2000 (2000-06-30) * abstract *	1,4,13, 14,17, 18,21,22										
P,A	-& US 6 259 858 B1 (ANDO ET AL) 10 July 2001 (2001-07-10) * abstract * * column 6, line 31 - line 67 * * column 8, line 40 - line 57 * * column 10, line 41 - column 12, line 18 *	1,4,13, 14,17, 18,21,22	TECHNICAL FIELDS SEARCHED (Int.Cl.)									
A	EP 0 863 509 A (TOKYO SHIBAURA ELECTRIC CO) 9 September 1998 (1998-09-09) * the whole document *	1,4,13, 14,17, 18,21,22										
<p>The present search report has been drawn up for all claims</p> <table border="1"> <tr> <td>Place of search</td> <td>Date of completion of the search</td> <td>Examiner</td> </tr> <tr> <td>THE HAGUE</td> <td>3 January 2003</td> <td>Daalmans, F</td> </tr> <tr> <td colspan="2">CATEGORY OF CITED DOCUMENTS</td> <td>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons A : technological background O : non-written disclosure P : Intermediate document &amp; : member of the same patent family, corresponding document</td> </tr> </table>				Place of search	Date of completion of the search	Examiner	THE HAGUE	3 January 2003	Daalmans, F	CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons A : technological background O : non-written disclosure P : Intermediate document & : member of the same patent family, corresponding document
Place of search	Date of completion of the search	Examiner										
THE HAGUE	3 January 2003	Daalmans, F										
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons A : technological background O : non-written disclosure P : Intermediate document & : member of the same patent family, corresponding document										

ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.

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03-01-2003

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